The Electroactive Polymers Infrastructure

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ABSTRACT

In the last ten years, new EAP materials have emerged that exhibit large displacement in response to electrical stimulation enabling great potential for the field. To develop efficient EAP that are robust for practical applications there is a need to establish an adequate EAP infrastructure. This requires developing adequate understanding of EAP materials' behavior, as well as effective processing and characterization techniques. Enhancement of the actuation force requires understanding the basic principles using computational chemistry models, comprehensive material science, electro-mechanics analytical tools and improved material processing techniques. Efforts are needed to gain better understanding of the parameters that control the EAP electro-activation force and deformation. The processes of synthesizing, fabricating, electroding, shaping and handling need to be refined to maximize the EAP materials actuation capability and robustness. Methods of reliably characterizing the response of these materials are required to establish database with documented material properties in order to support design engineers considering use of these materials and towards making EAP as actuators of choice. Various configurations of EAP actuators and sensors need to be studied and modeled to produce an arsenal of effective smart EAP driven system. The development of the infrastructure is a multidisciplinary task involving materials science, chemistry, electro-mechanics, computers, electronics, and others. This paper will be a review of the status of the EAP infrastructure and the challenges to practical application of EAP materials as actuators.

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